

Extending Usability of Personal Health Records

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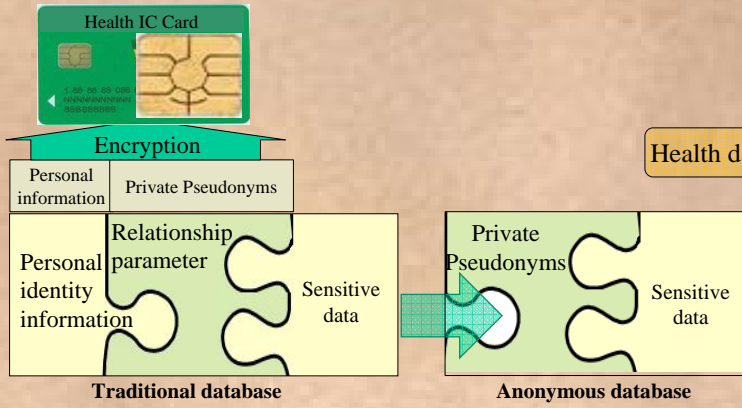


Figure 1: Concept of separating personal information from sensitive health data

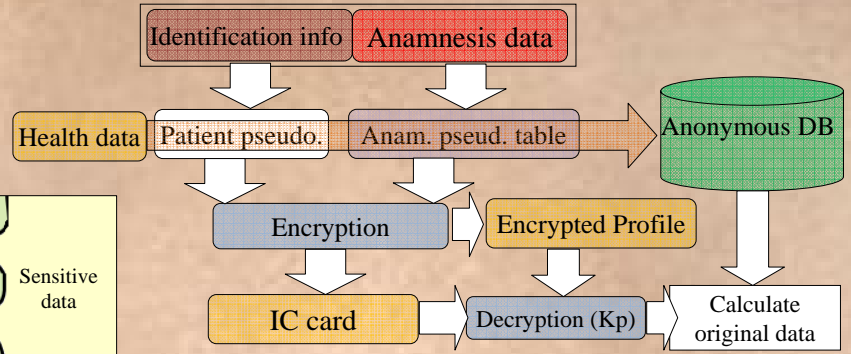
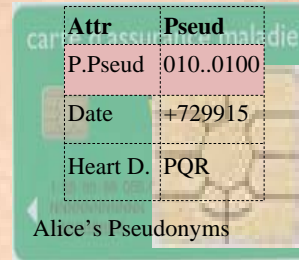


Figure 2: Database anonymization process in P³HR

Table 1: Example of anonymizing records

Name	T. Date	Disease
Alice	15-04-1951	Heart D.
Bob	23-07-1959	AIDS
John	09-11-1954	Heart D

Original records



P. Pseud	T. Date	Disease
101..1101	02-09-3459	DH
010..0100	25-01-2951	PQR
101..0111	12-12-2459	GTFD

Anonymous records

h = height of a domain hierarchy

Weighted hierarchical distance (WHD) of domain generalization (from height p to q)

$$WHD(p, q) = \frac{\sum_{j=q+1}^p \omega_{j,j-1}}{\sum_{j=2}^h \omega_{j,j-1}}$$

n = the number of attributes in the attribute set of anamnesis data

Av_i = availability {0,1} of i^{th} attribute

Let $t = \{v_1, v_2, \dots, v_m\}$ $m \leq n$ be a tuple, $t' = \{v'_1, v'_2, \dots, v'_m\}$ be a generalized tuple of t .

Scope of secondary use (SSU) :

$$SSU(t') = \frac{\sum_{i=1}^n Av_i \left(1 - \sum_{j=1}^m WHD(L(v_j), L(v'_j)) \right)}{n}$$

If N is the number of tuples in the table T ,

$$SSU(T) = \frac{\sum_{i=1}^N SSU(t_i)}{N}$$

$L(v_j)$ be the domain level of v_j

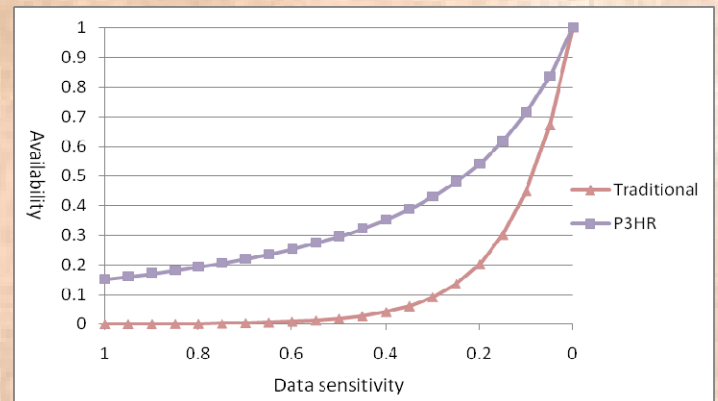


Figure 3: Data availability with change in data sensitivity

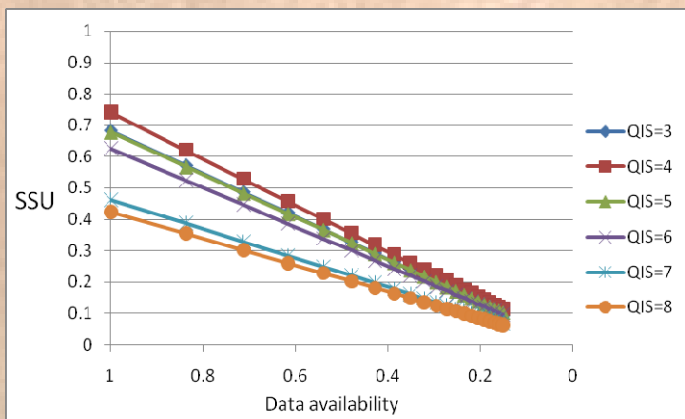


Figure 4: Scope for secondary use (SSU) in P³HR with change in data availability

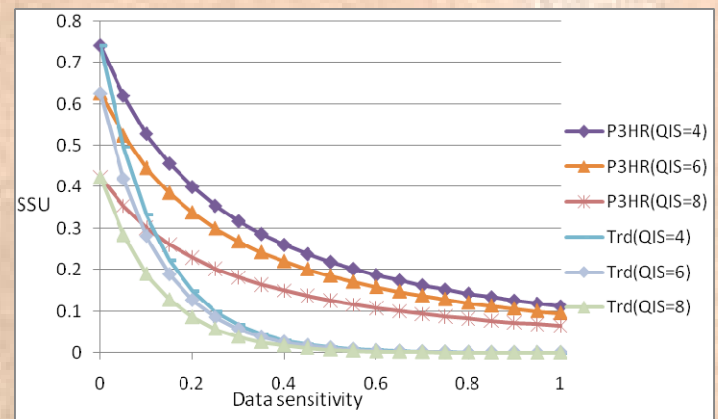


Figure 5: Comparative scope for secondary use (SSU) in P³HR and Traditional system